

CLAIMS

1. (Previously Presented) A method for packaging a device, comprising:
applying a sacrificial material to the device;
applying a layer of structural material adjacent the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;
creating one or more apertures in the housing of structural material to expose at least a portion of the adjacent sacrificial material, the apertures having a size and shape such that a removing material is able to pass through at least one of the apertures but a protective material cannot pass through the apertures;
removing the sacrificial layer, wherein the housing of structural material with at least one aperture remains;
depositing the protective material adjacent the housing of structural material overlaying at least one of the apertures in an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the device; and
curing the protective material.
2. (Original) The method of Claim 1, wherein the method further comprises:
providing a gas atmosphere, wherein the pressure is greater than or equal to 1 Pascal (Pa);
and
providing a temperature of less than 600° Celsius (C).
3. (Original) The method of Claim 2, wherein the sacrificial material has a higher etch rate than the structural material.
4. (Original) The method of Claim 3, wherein the sacrificial material comprises either a photoresist or a polyimide material.
5. (Original) The method of Claim 2, wherein the structural layer is selected from a group of Silicon Dioxide (SiO₂) and Silicon Nitride (Si₃N₄).

6. (Original) The method of Claim 2, wherein the step of removing portions of the structural layer comprises use of sputter etching or ion beam milling.

7. (Original) The method of Claim 2, wherein the step of removing the sacrificial layer comprises use chemical etching.

8. (Original) The method of Claim 2, wherein the step of removing the sacrificial layer comprises use of either plasma ashing or plasma etching.

9. (Original) The method in Claim 2, wherein the step of depositing a protective material comprises wicking the protective material into at least one aperture of the housing.

10. (Original) The method of Claim 2, wherein the step of depositing the protective material comprises applying the protective material to at least a portion of the surface of the housing and allowing the protective material to flow into at least a portion of an aperture in the housing.

11. (Original) The method of Claim 2, wherein the step of applying a layer of material comprises forming a structural layer having a thickness of between about 0.2 microns and about 20 microns.

12. (Original) The method of Claim 2, wherein the step of applying a sacrificial material comprises forming a sacrificial layer having a thickness of between about 0.2 microns and about 10 microns.

13-23. (Canceled)

24. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

forming a housing over the device, the housing having at least one aperture, the aperture having a size and shape such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture, wherein forming of the housing with at least one aperture further comprises:

applying a sacrificial material to the device;

applying a layer of structural material adjacent the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;

creating one or more apertures in the housing of structural material to expose at least a portion of the adjacent sacrificial material; and

removing the sacrificial layer, wherein the housing of structural material with at least one aperture remains;

depositing the protective material adjacent at least a portion of the housing, wherein the protective material at least flows into the at least one aperture, sealing the aperture in an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the at least one movable region of the device; and

curing the protective material.

25. (Canceled)

26. (Currently Amended) The method of Claim ~~25~~24, wherein the sacrificial layer has a higher etch rate than the structural material.

27. (Original) The method of Claim 26, wherein the sacrificial material comprises either a photoresist or a polyimide material.

28. (Currently Amended) The method of Claim ~~25~~24, wherein the structural layer is selected from a group of Silicon Dioxide (SiO₂) and Silicon Nitride (Si₃N₄).

29. (Currently Amended) The method of Claim ~~25~~24, wherein the step of removing portions of the structural layer is at least configured to use sputter etching or ion beam milling.

30. (Currently Amended) The method of Claim ~~25~~24, wherein the step of removing the sacrificial layer is at least configured to use chemical etching.

31. (Currently Amended) The method of Claim ~~25~~24, wherein the step of removing the sacrificial layer is at least configured to use plasma ashing or plasma etching.

32. (Currently Amended) The method of Claim ~~25~~24, wherein the step of applying a structural material comprises forming a structural layer between 0.2 microns and 20 microns thick.

33. (Currently Amended) The method of Claim ~~25~~24, wherein the step of applying a sacrificial material comprises forming a sacrificial layer is between 0.2 microns and 10 microns thick.

34-43. (Canceled)

44. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

determining a shape and size for an aperture, such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture;

forming a housing over the device, the housing having at least one aperture with the determined size and shape, wherein forming the housing comprises:

applying a sacrificial material to the device;

applying a layer of structural material adjacent the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;

creating one or more apertures in the housing of structural material to expose at least a portion of the adjacent sacrificial material; and

removing the sacrificial layer, wherein the housing of structural material with at least one aperture remains;

depositing the protective material adjacent at least a portion of the housing, wherein the protective material flows at least partially into the at least one aperture, sealing the aperture and is an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the at least one movable region of the device, and curing the protective material.

45. (Canceled)

46. (Currently Amended) The method of Claim ~~[[45]]~~44, wherein the sacrificial layer has a higher etch rate than the structural material.

47. (Original) The method of Claim 46, wherein the sacrificial material comprises either a photoresist or a polyimide material.

48. (Currently Amended) The method of Claim ~~[[45]]~~44, wherein the structural layer is selected from a group of Silicon Dioxide (SiO₂) and Silicon Nitride (Si₃N₄).

49. (Currently Amended) The method of Claim ~~[[45]]44~~, the step of removing portions of the structural layer is at least configured to use sputter etching or ion beam milling.

50. (Currently Amended) The method of Claim ~~[[45]]44~~, wherein the step of removing the sacrificial layer is at least configured to use chemical etching.

51. (Currently Amended) The method of Claim ~~[[45]]44~~, wherein the step of removing the sacrificial layer is at least configured to use plasma ashing or plasma etching.

52. (Currently Amended) The method of Claim ~~[[45]]44~~, wherein the step of applying a structural material comprises forming a structural layer between 0.2 microns and 20 microns thick.

53. (Currently Amended) The method of Claim ~~[[45]]44~~, wherein the step of applying a sacrificial material comprises forming a sacrificial layer is between 0.2 microns and 10 microns thick.

54-63. (Canceled)

64. (Currently Amended) A method for packaging a device, comprising:
providing a gas atmosphere, wherein the pressure is greater than or equal to 1 Pascal (Pa);
providing a temperature of less than 600° Celsius (C);
forming a housing over the device, the housing having at least one aperture;
forming the shape and size of the aperture, such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture;
removing a sacrificial material from within the housing through the at least one aperture;
depositing the protective material adjacent to the housing in an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the device; and
curing the protective material.

65. (Canceled)

66. (Currently Amended) A method for packaging a device having at least one movable region, comprising:

forming a housing over the device, the housing having at least one aperture;

forming the shape and size of the aperture, such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture;

removing a sacrificial material from within the housing through the at least one aperture;

placing the protective material adjacent to at least a portion of the housing forming a protective layer on the housing, wherein the protective material extends from about at least partially into the at least one aperture in an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the at least one movable region of the device; and

allowing or causing the protective layer to harden.

67. (Canceled)

68. (Previously Presented) A method for packaging a device, comprising:
applying a sacrificial material to the electromechanical device;
applying a layer of structural material adjacent the sacrificial material, the layer of structural material forming a housing adjacent at least a portion of the sacrificial material;
creating one or more apertures in the housing of structural material to expose at least a portion of the adjacent sacrificial material, such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture;
removing the sacrificial layer, wherein the housing of structural material with at least one aperture remains;
depositing the protective material adjacent the housing of structural material overlaying at least one of the one or more apertures of the housing in an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the microscopic device; and
curing the protective material.

69. (Currently Amended) A method for packaging a device having at least one movable region, comprising:
forming a housing over the device, the housing having at least one aperture;
forming the shape and size of the aperture, such that a removing material is able to pass through the aperture but a protective material cannot pass through the aperture;
removing a sacrificial material from within the housing through the at least one aperture;
depositing the protective material adjacent at least a portion of the housing, wherein the protective material at least flows into the at least one aperture, sealing the aperture in an amount sufficient to substantially close the aperture without entering the housing sufficiently to interfere with operation of the at least one movable region of the device; and
curing the protective material.

70. (Currently Amended) A method for packaging a device, the method comprising:
forming a housing over the device, the housing having at least one aperture; ~~and~~
forming the shape and size of the aperture, such that a removing material is able to pass
through the aperture but a protective material cannot pass through the aperture; and
removing a sacrificial material from within the housing through the at least one aperture.

71. (Canceled)

72. (Currently Amended) The method of Claim ~~71~~70 wherein removing a sacrificial
material comprises at least one selected from the list consisting of:
sputter etching, ion beam milling, chemical etching, plasma ashing, and plasma etching.

73. (Previously Presented) The method of Claim 70 further comprising:
depositing the protective material adjacent to the housing.

74. (Currently Amended) The method of Claim 70 further comprising:
providing a gas atmosphere about the device, wherein the pressure is greater than or equal to
1 Pascal (Pa); and
providing a temperature about the device of less than 600° Celsius (C).

75. (Currently Amended) The method of Claim 70 further comprising:
depositing a layer of structural material about the device, wherein the structural material has
a lower etch rate than the sacrificial material.

76. (Currently Amended) The method of Claim 70 further comprising:
depositing a layer of sacrificial material about the device, wherein the sacrificial material
comprises at least one selected from the list consisting of:
a photoresist and a polyimide material.

77. (Previously Presented) The method of Claim 70 further comprising:
depositing a layer of conductive material.

78. (Previously Presented) The method of Claim 77 wherein depositing a layer of conductive material comprises depositing a protective material adjacent to the housing.

79. (Previously Presented) The method of Claim 70 wherein determining a shape and size comprises determining a shape and size for an aperture such that a surface tension of the removing material enables the removing material to pass through at least one of the one or more apertures but a surface tension of the covering material prevents the covering material from passing through the one or more apertures.

80. (Currently Amended) A method for packaging a device, the method comprising:
covering the device with a sacrificial material;
covering the sacrificial material with a housing of structural material;
determining a shape and size for an aperture such that a removing material, having a first viscosity, is able to pass through the aperture but a protective material, having a second viscosity, cannot pass through the aperture; ~~and~~
creating, in the housing, one or more apertures having the determined size and shape; and
removing a sacrificial material from within the housing through the at least one aperture.